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PATENT APPLICATION

ATTORNEY DOCKET NO. 200302185-1IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): James M. Reuter, et al.

Confirmation No.: 3048

Application No.: 09/872,970

Examiner: Chankong, Dohm

Filing Date: 06/01/2001

Group Art Unit: 2152

Title: Architecture for Parallel Distributed Table Driven I/O Mapping

Mail Stop Appeal Brief-Patents  
Commissioner For Patents  
PO Box 1450  
Alexandria, VA 22313-1450TRANSMITTAL OF APPEAL BRIEFTransmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on 12/13/2005.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:☐ 1st Month  
\$120☐ 2nd Month  
\$450☐ 3rd Month  
\$1020☐ 4th Month  
\$1590☐ The extension fee has already been filed in this application.☒ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.Please charge to Deposit Account 08-2025 the sum of \$ 500. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.☐ I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:  
Commissioner for Patents, Alexandria, VA 22313-1450  
Date of Deposit:

Respectfully submitted,

James M. Reuter, et al.

By 

OR

☒ I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number (571)273-8300.

Date of facsimile: 12/19/2005

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Rev 10/05 (AplBrief)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
	)	
Reuter, James, et al.	)	Group Art Unit: 2152
	)	
Serial No.: 09/872,970	)	Examiner: Chankong, Dohm
	)	
Filing Date: 06/01/2001	)	Confirmation No.: 3048
	)	
For: Architecture for Parallel Distributed Table Driven I/O Mapping	)	

**APPEAL BRIEF**

To: Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted in response to the final rejections of the claims mailed October 6, 2005. A Notice of Appeal was filed on December 13, 2005.

**REAL PARTY IN INTEREST**

The assignee of the entire right, title, and interest in the patent application is Hewlett-Packard Development Company.

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**RELATED APPEALS AND INTERFERENCES**

There are currently no related appeals of other United States patent applications known to Appellants, Appellants' legal representative, or the assignee that will directly affect, or be directly affected by, or have a bearing on, the Board's decision. There are currently no related interferences known to Appellants, Appellants' legal representative, or the assignee which will directly affect, or be directly affected by, or have a bearing on, the Board's decision.

**STATUS OF CLAIMS**

Claims 1-30, 34, and 36-40 are pending in the application. In the Office Action mailed October 6, 2005, claims 1-30, 34, and 36-40 were finally rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 6,260,162 to Blumenau ("Blumenau") in view of U.S. Patent No. 5,404,351 to Casorso ("Casorso").

**STATUS OF AMENDMENTS**

No amendments have been filed subsequent to the final rejection.

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13032659241 From: Caven &amp; Aghevli LLC

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SUMMARY OF CLAIMED SUBJECT MATTER

The subject matter of the independent claims is summarized below with reference numerals and reference to the specification and drawings in accordance with 37 CFR §41.37.

Claim 1

Claim 1 is directed to a virtual storage system for linking a host to one or more storage devices over a network. The system comprises:

an agent (page 6, line 23 – page 8, line 20; reference numeral 110) connected to the host (page 6, line 23; reference numeral 140), the agent having volatile memory for storing a first copy of a table (page 8, line 20 – page 10, line 6; reference numeral 200), the table having entries to map virtual disk positions to locations on the storage devices; and

a controller (page 7, lines 15-27; reference numeral 120) coupled to the agent, the controller having non-volatile memory for storing a second copy of the table, the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table,

whereby during an input/output (I/O) operation, the host accesses one of the entries in the table stored on the agent to determine one of the storage device locations.

Claim 12

Claim 12 is directed to a system for mapping a virtual disk segment to a storage location within a storage device, comprising:

a host computer (page 6, line 23; reference numeral 140) to issue an I/O operation identifying a logical unit and a block identifier within the logical unit;

an agent (page 6, line 23 – page 8, line 20; reference numeral 110) connected to a host computer, the agent having a volatile memory module for storing a first copy of a table (page 8, line 20 – page 10, line 6; reference numeral 200) having entries to map a virtual disk position to a storage location on the storage devices and a plurality of variables indicating states of the respective entries; and

a controller coupled to the agent, the controller having non-volatile memory for storing a second copy of the table, the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table.

Claim 24

Claim 24 is directed to a method for performing an operation on a virtual disk coupled to a host (page 6, line 23; reference numeral 140) within a network, comprising:

specifying a block on the virtual disk within the operation (page 13, line 21- page 14, line 7);

accessing a table mapping the block to a storage location on a storage device (page 14, lines 21- page 14, line 7);

issuing a corresponding operation to the storage device, wherein the corresponding operation correlates to the operation on the virtual disk (page 15, lines 4-9);

completing the corresponding operation (page 15, lines 10-22); an

presenting the completed corresponding operation to the virtual disk (page 15, lines 10-22).

Claim 34

Claim 34 is directed to a computer program product comprising a computer useable medium having computer readable code embodied therein for performing an operation on a virtual disk coupled to a host (page 6, line 23; reference numeral 140) within a network, the computer program product adapted when run on a computer to effect steps including:

specifying a block on the virtual disk within the operation (page 13, lines 21- page 14, line 7);

accessing a table mapping the block to a storage location on a storage device ;

issuing a corresponding operation to the storage device, wherein the corresponding operation correlates to the operation on the virtual disk (page 15, lines 4-9);

completing the corresponding operation (page 15, lines 10-22); and

presenting the completed corresponding operation to the virtual disk (page 15, lines 10-22).

**GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

1. Whether claims 1-30, 34, and 36-40 are obvious under 35 U.S.C. §103(a) over Blumenau, alone or in combination with Casorso.



## ARGUMENT

### I. Rejections Under 35 U.S.C. §103

Claims 1-30, 34, and 36-40 were rejected under 35 U.S.C. §103(a) as being unpatentable over Blumenau in view of Casorso. These rejections are traversed based on the following arguments.

#### A. Claim 1

Claim 1 stands rejected over Blumenau. Applicants traverse this rejection, and assert that the final Action fails to establish a *prima facie* case of obviousness. Independent claim 1 includes limitations directed to “an agent connected to the host, the agent having volatile memory for storing a first copy of a table, the table having entries to map virtual disk positions to locations on the storage devices.” The first Action asserted that Blumenau disclosed this limitation, and cited Fig. 30 and col. 30, lines 53-55 and col. 32 lines 43-55 to support the assertion. Applicants traversed the rejection. In response, the second Action asserted that Blumenau disclosed this limitation, and cited Figs. 4, 22, 23, 24, 25,, column 25, lines 50-56, and column 32, lines 43-45. Applicants traversed the rejection. In response, the final Action asserts that Blumenau discloses this limitation, and now cites Figs. 4, 23-25, 30, column 14, lines 23-31, and col. 25, lines 50-56 and col. 32 lines 43-55 to support the assertion.

Applicants disagree. The cited text reads as follows:

For example, a volume access table 80 and volume lists 81 are stored in the memory 77. The volume access table specifies a correspondence between hosts and respective lists of volumes accessible to the hosts. A back-up copy of the volume access table and volume list could be stored in one of the storage volumes of the cached storage subsystem.

The random access memory 236 is further programmed with volume

access and mapping information 246. The volume access information indicates a respective set of storage LUNs that any host can access by requests addressed to the virtual ports 240, 241.

Contrary to the assertion in the Action, nothing in this text discloses or suggests an agent connected to the host, *the agent having volatile memory for storing a first copy of a table*, the table having entries to map virtual disk positions to locations on the storage devices, as recited in claim 1.

Independent claim 1 further includes limitations directed to “a controller coupled to the agent, the controller having non-volatile memory for storing a second copy of the table, the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table.” The first Action asserted that Blumenau discloses this limitation, and cited Figs. 4-5 and col. 14, lines 27-31 and col. 25 lines 1-7 to support the assertion. Applicants traversed the rejection. In response, the second Action asserted that Blumenau discloses this limitation, and cited Fig. 21, item 27, and column 32, lines 43-54 to support the assertion. Applicants traversed the rejection. In response, the final Action asserted that Blumenau discloses this limitation, and now cites Fig. 21, item 27, column 14, lines 31-33, column 21, lines 35-40, and col. 32 lines 43-54 to support the assertion.

Applicants disagree. The cited text reads as follows:

A back-up copy of the volume access table and volume list could be stored in one of the storage volumes of the cached storage subsystem.

In step 166, execution continues to step 167 if the system administrator has no more group names to enter; otherwise, execution loop back to step 161. In step 167, the volume access table and volume lists are copied to a storage volume as back-up for port adapter error recovery or diagnostic purposes, and the routine if finished.

A primary copy of the configuration information for the volumes accessible to a host is kept in the storage subsystem and on the host. The host should be able to access the primary copy on the storage subsystem if a host's local copy is not available. However, an exception to this would be a host that

is responsible for storing the primary copy of another host. The configuration information should be accessed through read and write commands and should be protected against accidental writes. For example, the configuration information is stored in a predefined logical volume, such as a volume accessed at LUN0, that functions as a gatekeeper device.

Contrary to the assertion in the final Action, nothing in this text discloses or suggests *a controller coupled to the agent, the controller having non-volatile memory for storing a second copy of the table, the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table*, as recited in claim 1.

Further, nothing in Blumenau, alone or in combination with Casorso, discloses or suggests that the controller intermittently causes contents of the first table to be replaced by contents of the second table, as recited in claim 1. The final Action appears to assert that this limitation is inherent in Blumenau. To the extent that the Examiner's comments indicate that the Examiner considers limitation of claims 1 taught by inherency, Applicants assert that the record fails to provide any factual support for a finding of teaching by inherency. To prove inherency, the Examiner must establish that the system disclosed in Blumenau *necessarily* includes the structure recited in claim 1. Continental Can Co. U.S.A. v. Monsanto Co., 948 F.2d 1264, 1268 (Fed. Cir. 1991). There is no such showing on the record.

In sum, contrary to the assertion in the Action, Blumenau, alone or in combination with Casorso, neither discloses nor suggests the limitations of independent claim 1. Accordingly, Blumenau, alone or in combination with Casorso, cannot render obvious independent claim 1.

B. Claim 2

Applicants traverse the rejection of claim 2. Claim 2 includes a limitation reciting “the table entries further include an indication of whether an invalid state is activated such that the invalid state for a table entry becomes activated when that table entry contains no useable mapping information.” The final Action acknowledges that Blumenau fails to disclose an invalid state (See, paragraph 9), but asserts that “[h]owever, it would have been obvious to one of ordinary skill in the art to modify the teaching of Blumenau to restrict access to a particular portion of the storage location by making the entry state invalid.”

Applicants agree that Blumenau fails to disclose or suggest an invalid state. Hence, Blumenau cannot provide the motivation to include an invalid state.

However, the final Action asserts that “[o]ne of ordinary skill in the art would have been motivated to add this function to restrict unauthorized access to private data that the user does not want others to see or share.” Applicants disagree. Claim 2 specifically recites that *the invalid state for a table entry becomes activated when that table entry contains no useable mapping information*. The claim language is wholly unrelated to restricting unauthorized access to private data. Hence, one of ordinary skill in the art seeking to restrict access to private data would have no motivation to invoke an invalid state when a table entry contains no useable mapping information, as recited in claim 2.

C. Claim 3

Claims 3 stands rejected over Blumenau. Applicants traverse this rejection, and assert that the final Action fails to establish a *prima facie* case of obviousness.

Claim 3 includes a limitation that “the agent does not allow the host to complete the I/O operations with one of the entries if the invalid state for that entry is activated.” The

rejection in the final Action provides no factual basis whatsoever to establish that each element of claim 3 is disclosed or suggested by the cited references. Hence, the Action fails to establish a *prima facie* case of obviousness for claim 3.

D. Claim 12

Claim 12 stands rejected over Blumenau. Applicants traverse this rejection, and assert that the final Action fails to establish a *prima facie* case of obviousness.

Independent claim 12 recites limitations directed to “an agent connected to a host computer, the agent having a volatile memory module for storing a first copy of a table having entries to map a virtual disk position to a storage location on the storage devices and a plurality of variables indicating states of the respective entries” and “a controller coupled to the agent, the controller having non-volatile memory for storing a second copy of the table, the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table.”

The final Action rejected independent claim 12 “for similar reasons as claims 1-5 and 8-11.” Applicants traverse these rejections, and assert the arguments asserted above with respect to claim 1.

E. Claim 24

Claim 24 stands rejected over Blumenau in combination with Casorso. Applicants traverse this rejection, and assert that the final Action fails to establish a *prima facie* case of obviousness.

Independent claim 24 is directed to a method for performing an operation on a virtual disk coupled to a host within a network, and recites:

- specifying a block on the virtual disk within the operation;
- accessing a table mapping the block to a storage location on a storage device;
- issuing a corresponding operation to the storage device, wherein the corresponding operation correlates to the operation on the virtual disk;
- completing the corresponding operation; and
- presenting the completed corresponding operation to the virtual disk.

The final Action rejected claim 24 under 35 U.S.C. §103(a) as being rendered obvious by Blumenau in combination with Casorso. Applicant traverses the rejection, and asserts that the Action fails to make a *prima facie* showing of obviousness.

The final Action appears to assert that Figs. 23-25 of Blumenau disclose the limitations of “specifying a block on the virtual disk within the operation” and “accessing a table mapping the block to a storage location on a storage device.” Applicants traverse the rejection. A close inspection of Blumenau reveals that Figs. 23-25 are examples of mapping tables. The mapping tables in Figs. 23-25 neither disclose nor suggest “specifying a block on the virtual disk within the operation” and “accessing a table mapping the block to a storage location on a storage device” as recited in claim 24. Hence, the Action fails to make a *prima facie* showing of obviousness.

F. Claim 34

Claim 34 stands rejected over Blumenau in combination with Casorso. Applicants traverse this rejection, and assert that the final Action fails to establish a *prima facie* case of obviousness.

The final Action rejected independent claim 34 “for similar reasons as claims 24 and 31.” Applicants traverse these rejections, and assert the arguments asserted above with respect to claim 24.

CONCLUSIONS

Blumenau, alone or in combination with Carsuso fails to disclose or suggest limitations of appellants' claims. Therefore, Blumenau cannot be used to establish the required *prima-facie* case of obviousness under 35 U.S.C. §103. Appellants urge the Board to reverse the examiner's rejections under 35 U.S.C. §103 of claims 1-30, 34, and 36-40.

Respectfully submitted,

Jed W. Caven  
Caven & Aghevli LLC  
Attorney for Applicants

A handwritten signature in black ink, appearing to read 'Jed W. Caven', with a stylized, cursive script.

By:  
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Date: December 19, 2005



## APPENDIX A

### Claims

1. A virtual storage system for linking a host to one or more storage devices over a network, the system comprising:
  - an agent connected to the host, the agent having volatile memory for storing a first copy of a table, the table having entries to map virtual disk positions to locations on the storage devices; and
  - a controller coupled to the agent, the controller having non-volatile memory for storing a second copy of the table, the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table,whereby during an input/output (I/O) operation, the host accesses one of the entries in the table stored on the agent to determine one of the storage device locations.
2. The system of claim 1, wherein the table entries further include an indication of whether an invalid state is activated such that the invalid state for a table entry becomes activated when that table entry contains no useable mapping information.
3. The system of claim 2, wherein the agent does not allow the host to complete the I/O operations with one of the entries if the invalid state for that entry is activated.
4. The system of claim 1, wherein the table entries further include an indication of whether a no-write state is activated such that the no-write state for one of the entries becomes activated when data cannot be written to the storage location contained in that entry.
5. The system of claim 4, wherein the agent does not allow the host to write data to the storage location in one of the entries if the no-write state for that entry is activated.
6. The system of claim 1, further comprising a communication channel to couple the agent and the controller.
7. The system of claim 6, wherein the communication channel employs a data transfer protocol to transport messages on the communication channel.
8. The system of claim 1, wherein the entries include an offset.

9. The system of claim 8, wherein the offset includes logic unit number identifier.
10. The system of claim 8, wherein the offset includes a block identifier.
11. The system of claim 10, wherein the entries further includes a segment of virtual disk positions.

12. A system for mapping a virtual disk segment to a storage location within a storage device, comprising:
- a host computer to issue an I/O operation identifying a logical unit and a block identifier within the logical unit;
  - an agent connected to a host computer, the agent having a volatile memory module for storing a first copy of a table having entries to map a virtual disk position to a storage location on the storage devices and a plurality of variables indicating states of the respective entries; and
  - a controller coupled to the agent, the controller having non-volatile memory for storing a second copy of the table, the controller intermittently causing contents of the first copy of the table to be replaced by contents of the second copy of the table.
13. The system of claim 12, wherein the memory is volatile.
14. The system of claim 12, wherein said storage location comprises a block of data within the storage device.
15. The system of claim 14, wherein the block of data is 1 MB.
16. The system of claim 12, wherein the agent is coupled to the host.
17. The system of claim 12, wherein the plurality of variables comprise Boolean variable.
18. The system of claim 12, wherein the states include an invalid state.
19. The system of claim 18, wherein the plurality of variables includes a variable for the invalid state.
20. The system of claim 12, wherein the states include a no-write state.
21. The system of claim 20, wherein the plurality of variables includes a variable for the no-write state.
22. The system of claim 12, wherein the states include a zero state.
23. The system of claim 12, wherein the states include an error state.

24. A method for performing an operation on a virtual disk coupled to a host within a network, comprising:
- specifying a block on the virtual disk within the operation;
  - accessing a table mapping the block to a storage location on a storage device;
  - issuing a corresponding operation to the storage device, wherein the corresponding operation correlates to the operation on the virtual disk;
  - completing the corresponding operation; and
  - presenting the completed corresponding operation to the virtual disk.
25. The method of claim 24, wherein the issuing step includes issuing the corresponding operation from an agent coupled to the host.
26. The method of claim 24, further comprising updating the table with a persistently-stored table residing in a non-volatile memory.
27. The method of claim 24, further comprising determining states of the table.
28. The method of claim 24, further comprising sending a fault message when the table is unable to be accessed.
29. The method of claim 24, further comprising storing the table in a volatile memory.
30. The method of claim 24, further comprising receiving updates for the table from a controller.
- 31-33. Canceled

34. A computer program product comprising a computer useable medium having computer readable code embodied therein for performing an operation on a virtual disk coupled to a host within a network, the computer program product adapted when run on a computer to effect steps including:
- specifying a block on the virtual disk within the operation;
  - accessing a table mapping the block to a storage location on a storage device;
  - issuing a corresponding operation to the storage device, wherein the corresponding operation correlates to the operation on the virtual disk;
  - completing the corresponding operation; and
  - presenting the completed corresponding operation to the virtual disk.
35. Canceled.
36. The system of claim 12, wherein said storage location comprises a variable sized group of contiguous virtual disk blocks.
37. The system of claim 12, wherein said table entry represents a variable sized group of contiguous virtual disk blocks.
38. The system of claim 37, wherein said contiguous virtual disk blocks map to contiguous blocks on a storage container.
39. The system of claim 12, wherein said table entry comprises a beginning block.
40. The system of claim 12, wherein said table entry comprises an ending block.